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(54) Abstract Title

Displaying information in a folding communication terminal

(57) An apparatus and a method for displaying information in a folding communication terminal. The user can view displayed information even when the folding part is closed. A transparent LCD is fixedly mounted in an opening formed through the folding part so that an image may be viewed in either the open or closed status of the folding part. The present invention also provides a method capable of controlling a transparent LCD in such a fashion that the image is displayed in a normal orientation in either the open or closed status of the folding part. A folder sensing unit detects whether the folding part is open or closed. Based on the result of the detection, the transparent LCD is controlled to display the image in a normal orientation for viewing by the user.

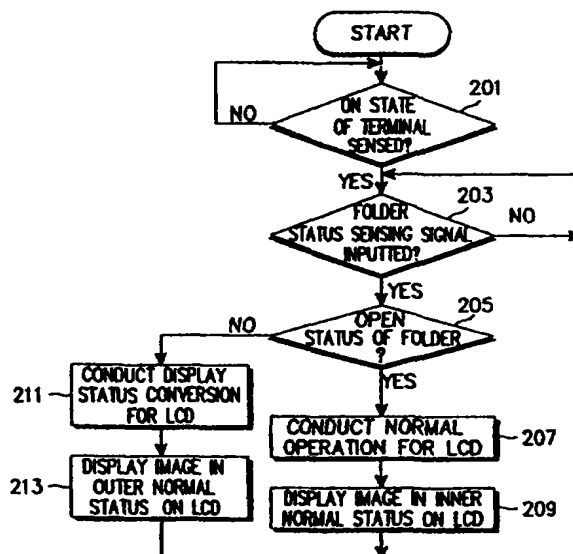


FIG. 4

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

GB 2 349 784 A

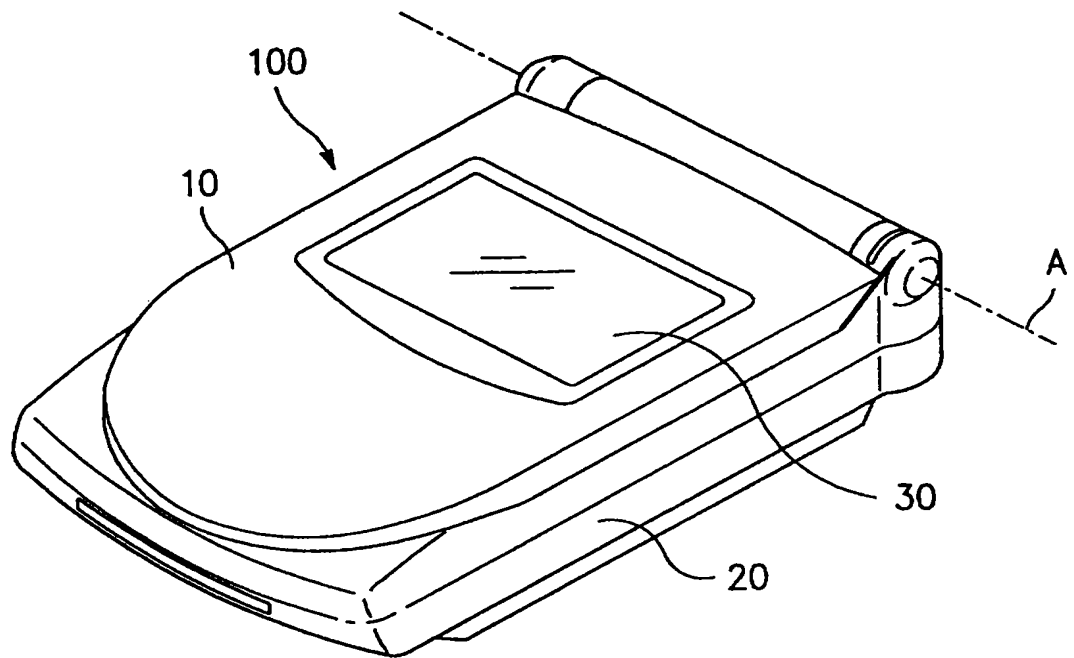


FIG. 1

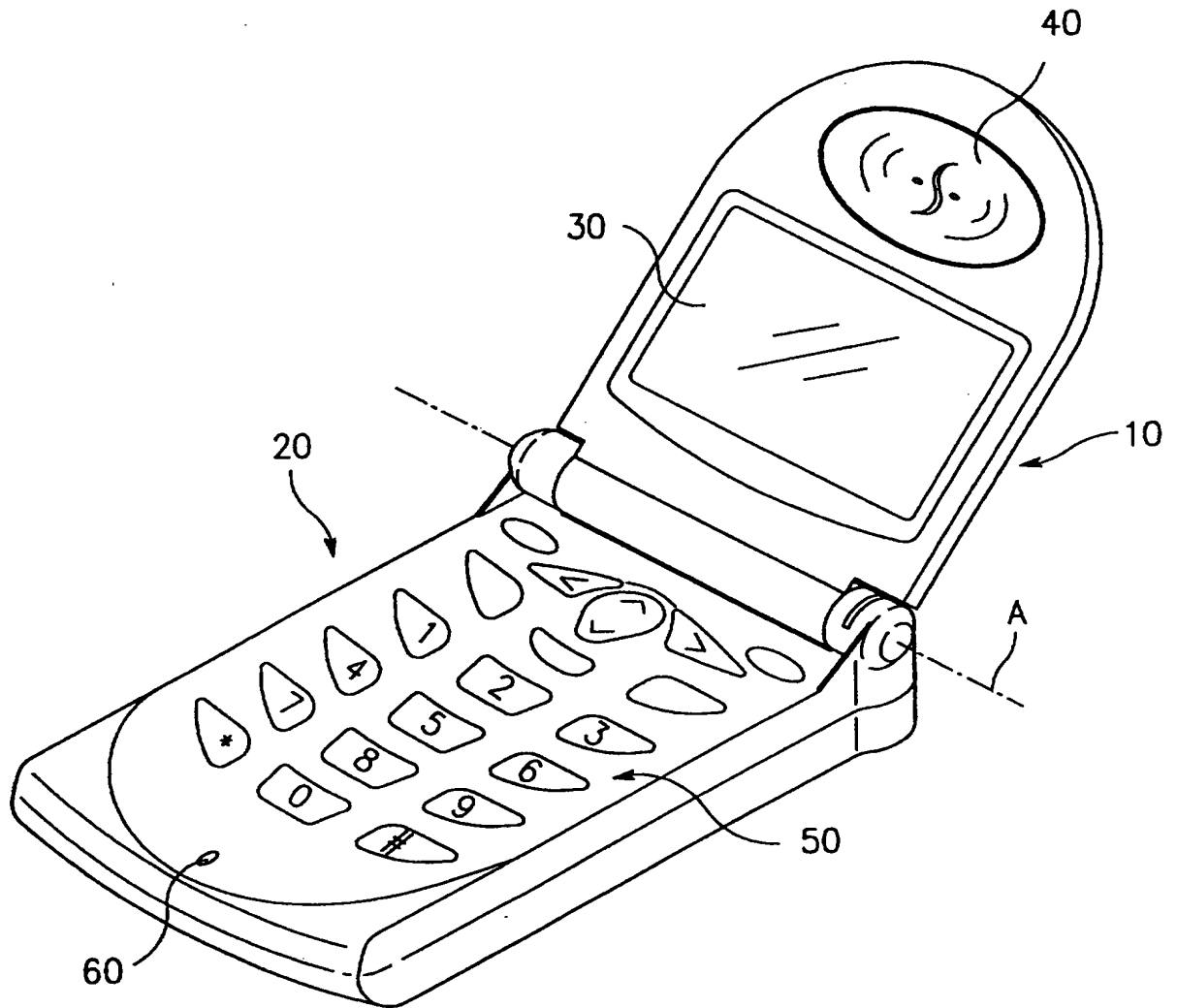
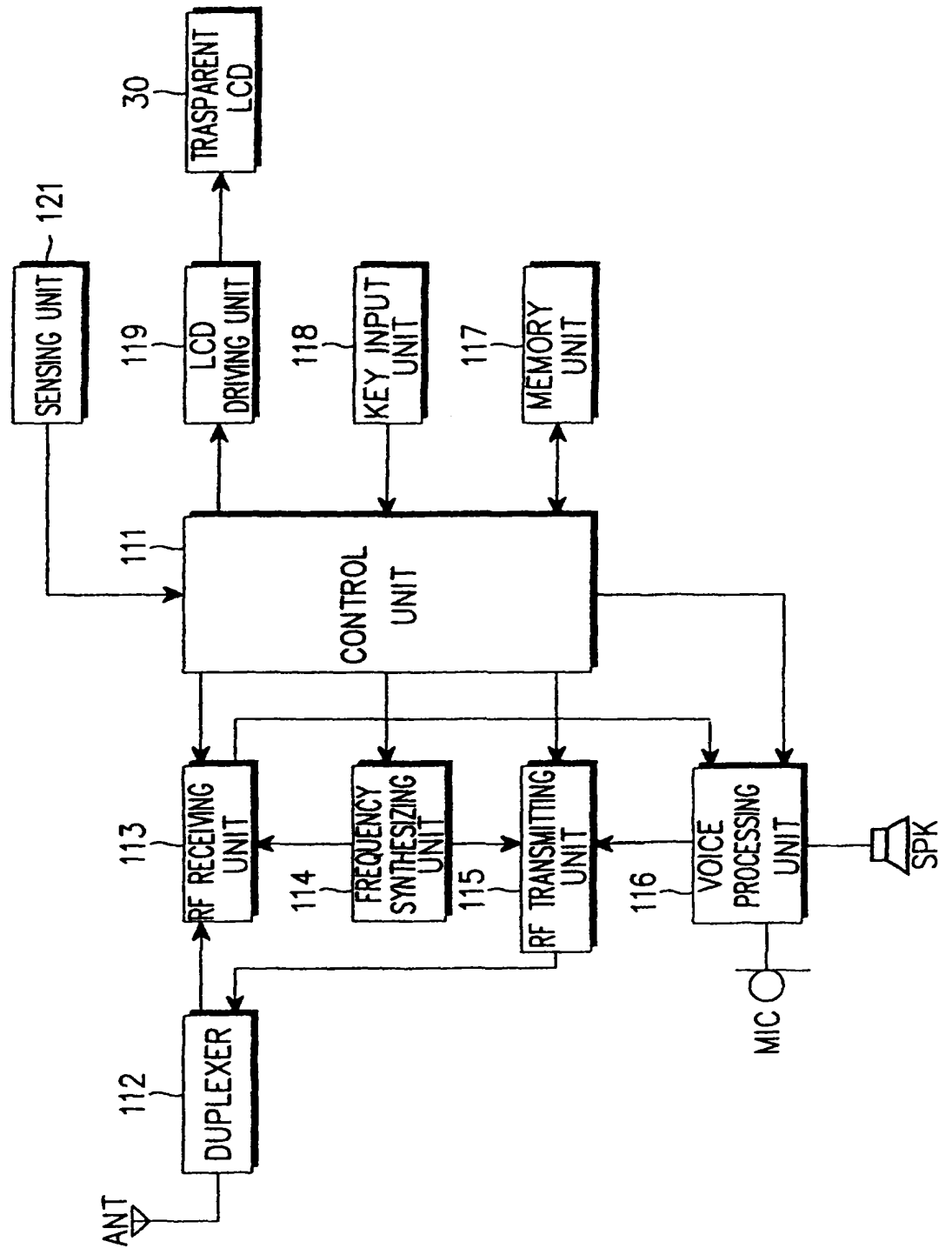


FIG. 2

FIG. 3



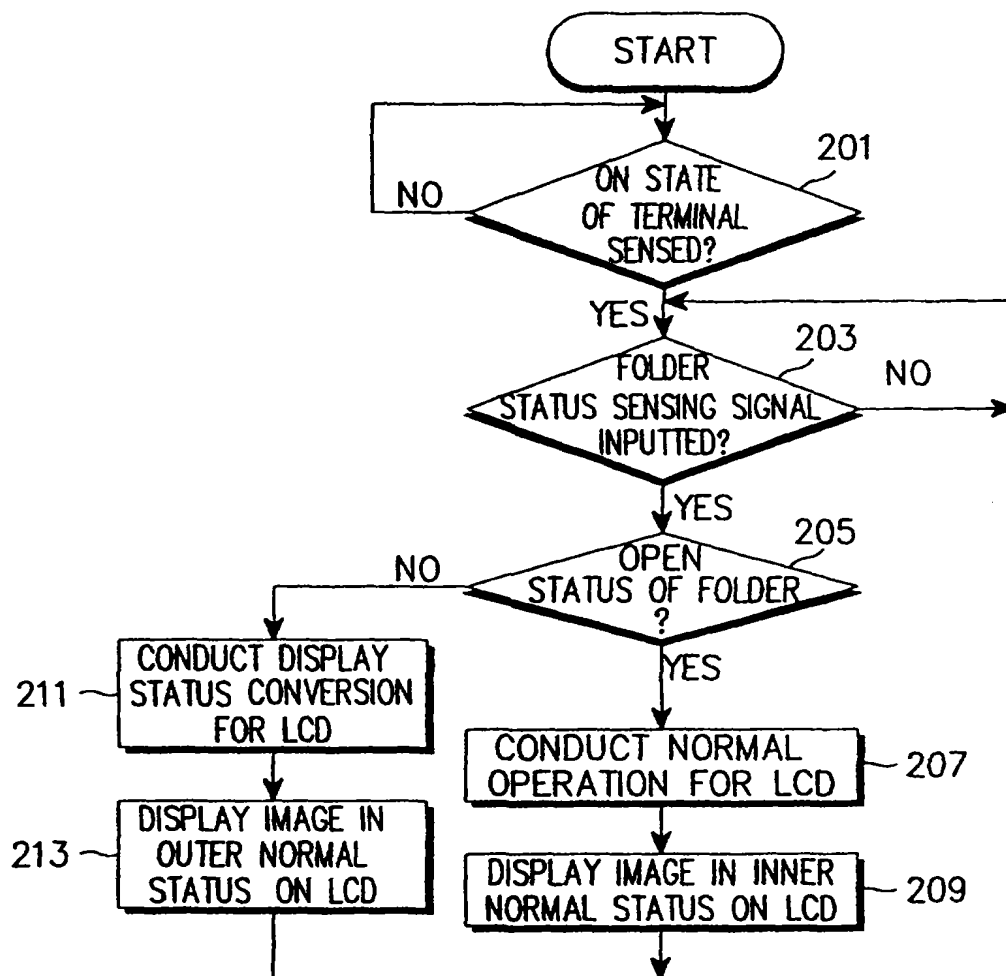


FIG. 4

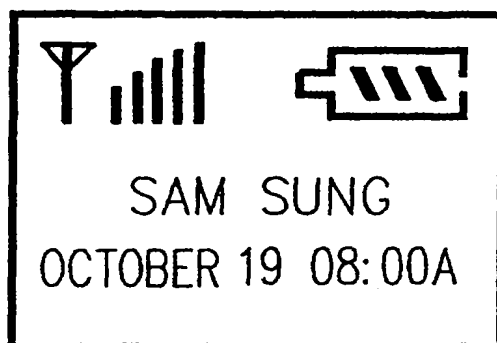


FIG. 5A

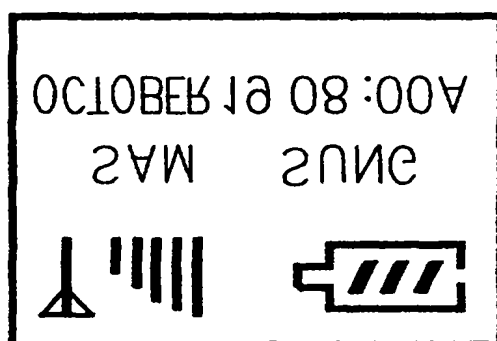


FIG. 5B

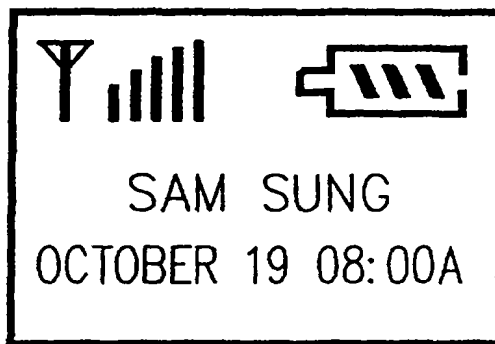


FIG. 6A

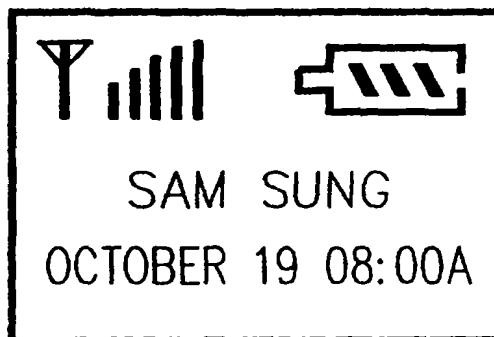


FIG. 6B

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APPARATUS AND METHOD FOR DISPLAYING INFORMATION  
IN A FOLDING COMMUNICATION TERMINAL

**Background of the Invention**

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The present invention relates to an apparatus for and a method of displaying information in a folding communication terminal, in such a fashion that the user can view the displayed information even when the folding part is closed.

10

Generally, folding communication terminals are beneficial in that they allow a reduced volume while having keys and a display, the sizes of which are equal to or larger than those of bar type and flip type communication terminals.

15

Known folding communication terminals suffer in that the user can view the display screen of the terminal only when the folding part of the terminal is open. That is, the user cannot view, for example, information about communication possibility, consumption of battery power, time, and date, when the folding part is closed. There is a disadvantage in that the user must open the folding part in order to view such information.

20

25

**Summary of the Invention**

The present invention addresses the above-described problems. Therefore, it is an object of the present invention to provide a folding communication terminal, which is capable of allowing the user to view displayed

30



information even though the folding part of the terminal is not open.

5 The present invention to provides a folding communication terminal which is capable of allowing the user to confirm information displayed in either the open or closed status of the folding part of the terminal, using a single display unit mounted to the folding part of the terminal.

10 The present invention preferably allows the user to view the image in its normal orientation, whether the folding part is open or closed.

15 According to an aspect of the present invention, the invention preferably provides a folding communication terminal, comprising a folding part of the communication terminal; and a transparent display unit mounted in an opening formed through a portion of the folding part, the display unit being visible from both inner and outer  
20 sides of the folding part, whereby images displayed on the display unit are visible to a user irrespective of whether the folding part is open or closed.

25 The folding communication terminal may further comprise a sensing unit for generating a sensing signal according to whether the communication terminal is open or closed; and a control unit for displaying an image on the display unit according to the sensing signal, such that the image is displayed in a normal orientation when viewed from one  
30 of inner and outer sides of the folding part, according to the sensing signal.

Such a folding communication terminal may further comprise a driving unit for driving the display unit under the control of the control unit.

5

A folding communication terminal of the invention may further comprise a memory unit, itself including a first display status address region for storing address designation information adapted to allow the image to be  
10 displayed in a normal orientation on the display unit, when viewed from the outer side of the folding part, and a second display status address region for storing address designation information adapted to allow the image to be displayed in a normal orientation on the  
15 display unit, when viewed from the inner side of the folding part. The folding communication terminal may further comprise a control means for selecting one of the display status address regions, based on the sensing signal, and a driving unit for driving the display unit  
20 under the control of the control unit.

A folding communication terminal of the invention may further comprise a memory unit, itself including an address region for storing address designation  
25 information associated with an image to be displayed on the display unit; and a program storage region for storing address conversion programs adapted to be selectively designated in accordance with the sensing signal. The folding communication terminal may further  
30 comprise a control means for selecting one of the address conversion programs, and for correspondingly converting

the address designation information, in accordance with the sensing signal.

According to a further aspect of the present invention, a method is provided for displaying information in a folding communication terminal, itself having a sensing unit for detecting whether a folding part is open or closed, and a transparent display unit mounted in an opening formed through the folding part, the transparent display unit being visible from both inner and outer sides of the folding part. The method comprises the steps of detecting whether the folding part is open or closed; and controlling the display unit, based on the result of the detection, such that when the folding part is closed, the image is displayed in a normal orientation as viewed from the outer side of the folding part, while being displayed in an inverted orientation as viewed from the inner side of the folding part.

The method may further comprise the step of controlling the display unit, based on the result of the detection, such that when the folding part is open, the image is displayed in a normal orientation as viewed from the inner side of the folding part, while being displayed in an inverted orientation as viewed from the outer side of the folding part.

In a folding communication terminal which further includes a memory unit including a first display status address region for storing address designating information adapted to allow an image to be displayed in

a normal orientation as viewed from the inner side of the folding part, and a second display status address region for storing address designating information adapted to allow the image to be displayed in a normal orientation as viewed from the outer side of the folding part, and a driving unit for driving the display unit, the method may further comprise the steps of selecting one of the first and second display status address regions, based on the result of the detection; reading address information, associated with the image to be displayed on the display unit, from the selected display status address region, and controlling the display unit, based on the read address information, to display the image.

15 Alternatively, in a folding communication terminal which further includes a memory unit including an address region containing address designation information associated with an image to be displayed on the display unit and address conversion programs, and a control unit for converting the address information associated with the image to be displayed, the method may further comprise the steps of reading address information, associated with the image to be displayed on the display unit, from the address region; selecting one of the address conversion programs, according to whether the folding part is open or closed; in accordance with the selected one of the address conversion programs, converting the read address information into address information suitable for displaying the image in the relevant orientation; and displaying the image in the relevant orientation.

In particular embodiments of the invention, one or more of the following features may be provided. A transparent LCD is fixedly mounted in an opening formed through a portion of the folding part so that an image indicative of the information to be displayed is viewed in either the open or closed status of the folding part. A configuration is provided which is capable of controlling the transparent LCD in such a fashion that the image is displayed in a normal status in either the open or closed status of the folding part. A folder sensing unit detects whether or not the folding part is open or closed. Based on the result of the detection, the transparent LCD is controlled to display the image in a normal status thereon in the sensed status of the folding part.

#### **Brief Description of the Drawings**

The above, and further, objects, characteristics and advantages of the present invention will become more apparent by reference to the following detailed description of certain embodiments thereof, with reference to the attached drawings in which:

Fig. 1 is a perspective view of a folding communication terminal according to an embodiment of the present invention, in which a folding part having a transparent LCD mounted therein is closed;

Fig. 2 is a perspective view of a folding communication terminal according to an embodiment of the present

invention, in which the folding part is open;

Fig. 3 is a block diagram showing a circuit configuration of a folding communication terminal according to an  
5 embodiment of the present invention;

Fig. 4 is a flowchart illustrating a control method in accordance with the present invention for displaying an image in a normal orientation irrespective of whether the  
10 folding part of the folding communication terminal is open or closed;

Figs. 5A and 5B represent images as viewed from inner and outer sides, respectively, of the folding part of a  
15 folding communication terminal having a display unit comprising a transparent LCD, according to an embodiment of the present invention; and

Figs. 6A and 6B represent images as viewed from inner and  
20 outer sides, respectively, of the folding part of a folding communication terminal having a display unit comprising a transparent LCD, according to a further embodiment of the present invention. In this particular embodiment, the display is arranged so that the image  
25 viewed from the inner side of the folding part when it is open, and the image viewed from the outer side of the folding part when it is closed, are both displayed in a normal orientation.

## Detailed Description of Certain Embodiments of the Invention

Fig. 1 is a perspective view of a folding communication terminal 100 according to an embodiment of the present invention with its folding part 10 closed. The folding part 10 contains a transparent liquid crystal display 30 (hereinafter, referred to as a transparent LCD), mounted so as to be visible from the outer side of the folding part 10 when the folding part is closed, and also visible from the inner side of the folding part 10 when the folding part is open.

A transparent LCD 30 is an LCD having no reflecting plate. In a conventional LCD, such a reflecting plate is attached to the rear surface of the LCD. Such a conventional LCD assembly is opaque and configured to allow the user to view information displayed on the display screen only from one side. However, a transparent LCD, having no reflecting plate, is configured to allow the user to view information displayed on its display screen from both sides.

Fig. 2 is a perspective view of the folding communication terminal of Fig. 1 in which the folding part 10 is open, by rotation of the folding part 10 about hinge axis A.

The present invention provides a folding communication terminal capable of allowing the user to view the display screen regardless of whether the folding part is open or closed, while preferably using a single display unit. In

a certain embodiment of the present invention, a transparent LCD is used for the display unit. A folding communication terminal according to such an embodiment, illustrated in Fig. 2, includes a transparent LCD 30,  
5 mounted in an opening formed through the folding part 10 in such a fashion that the active surface area of the LCD is completely exposed to view at both sides of the folding part 10 through the opening. The opening has a size approximately equal to the active surface of the  
10 transparent LCD 30.

In the folding communication terminal 100 shown in Figs. 1 and 2, the folding part 10 can be folded (closed) and unfolded (opened) around the hinge axis A with respect to  
15 a body 20. A speaker 40 is disposed at an upper portion of the inner surface of the folding part 10, namely, a surface of the folding part 10 exposed when the folding part is opened. The position of the speaker 40 corresponds to a portion of the terminal coming into  
20 proximity or contact with the ear of the user when the terminal is normally used for conversation. The transparent LCD 30 is disposed below the speaker 40. As mentioned above, the transparent LCD 30 is fixedly mounted in the opening formed through the folding part 10  
25 in such a fashion that the display screen thereof is visible from both sides of the folding part 10. A plurality of keys 50 and a microphone 60 are arranged on an upper surface (front surface) of the body 20, which is exposed when the folding part 10 is opened.

30

While a transparent LCD 30 allows displayed information



to be viewed from both sides, the displayed information has different image orientations according to which side of the LCD is viewed. That is, the image viewed from one side of the LCD 30 has a normal orientation whereas the same image viewed from the other side of the LCD 30 has an inverted orientation; it is a 'mirror image' of the image seen from the first side. Therefore, there is a problem in that it may be difficult for the user to understand displayed information viewed in an inverted orientation. Accordingly, certain embodiments of the present invention comprise technical means capable of solving this problem. This will be described in conjunction with a configuration shown in Fig. 3.

For the convenience of explanation in the following description, the two sides of the LCD screen will be referred to as an inner side and an outer side, corresponding to the side visible from the inside of the folding part when it is open, and the side visible from the outside of the folding part, particularly when it is closed.

Fig. 3 is a block diagram showing a circuit configuration of a folding communication terminal according to an embodiment of the present invention. A duplexer 112 transfers signals received by an antenna ANT to a radio-frequency (RF) receiving unit 113 while transmitting signals received from an RF transmitting unit 115 to the antenna ANT. The RF receiving unit 113 transfers received data to a control unit 111. When in a communication mode, the RF receiving unit 113 also sends voice signals

to a voice processing unit 116. A frequency synthesising unit 114 generates a carrier removing signal under the control of control unit 111, and transfers it to the RF receiving unit 113. In addition, the frequency synthesising unit 114 generates a carrier signal for signal transmission, and transfers it to the RF transmitting unit 115. The RF transmitting unit 115 synthesises the signal-transmission carrier signal received from the frequency synthesising unit 114 with a voice signal received from the voice processing unit 116 under the control of the control unit 111, as discussed further below, then transfers the resultant signal to the duplexer 112. The voice processing unit 116 demodulates an encoded voice signal received from the RF receiving unit 113 under the control of the control unit 111, and then outputs the resultant voice signal through the speaker SPK. Furthermore, the voice controlling unit 116 encodes an electrical voice signal received from a microphone MIC, and then sends the encoded voice signal to the RF transmitting unit 115. A key input unit 118 has a key matrix array structure (not shown), and generates key input signals corresponding to keys depressed by the user. The key input signals from the key input unit 118 are applied to the control unit 111.

25

A sensing unit 121 detects whether the folding part is open or closed, and sends a corresponding detection signal to the control unit 111.

30 A memory unit 117 includes a program memory (not shown) for storing a control program required for operation of

the control unit 111, and a data memory (not shown) for temporarily storing control data generated when the control unit 111 operates. The data memory may include a first display status address region for storing address designation information adapted to allow an image to be displayed in a normal orientation on the inner side of the transparent LCD 30 when the folding part 10 is open. The data memory also contains a second display status address region for storing address designation information adapted to allow an image to be displayed in a normal orientation on the outer side of the transparent LCD 30 when the folding part 10 is closed. The address designation information stored in the first display status address region of the memory unit 117 and the address designation information stored in the second display status address region of the memory unit 117 together form information designating addresses for allowing the LCD 30 to display an image to a user in a normal orientation, regardless of whether the folding part is open or closed.

The control unit 111 controls the overall operation of the communication terminal 100, and especially conducts a display control method according to an aspect of the present invention. That is, the control unit 111 outputs an LCD drive control signal via LCD driving unit 119, to allow the transparent LCD 30 to display an image in a normal orientation on either the inner side or the outer side of the LCD display 30, in accordance with a detecting signal from the sensing unit 121. The LCD drive control signal serves to designate one of the

display status address regions corresponding to the sensing signal from the sensing unit 121, thereby allowing the transparent LCD 30 to display an image in a normal orientation for viewing by the user.

5

The transparent LCD 30 is mounted in the opening formed through the folding part 10 as described above. Since the transparent LCD 30 has no reflecting plate, it is possible to view the image displayed on the transparent LCD 30 at both sides, namely, inner and outer sides, of the transparent LCD 30. The displayed image may include an icon indicative of the intensity of signals received to the terminal, a battery icon, and a variety of other information in text or pictogram form.

15

In response to the LCD drive control signal from the control unit 111, one of the first and second display status addresses is designated in accordance with the detected open or closed status of the folding part. An LCD driving unit 119 accordingly drives the transparent LCD 30 to display an image in a normal orientation for viewing by the viewer.

Fig. 4 is a flowchart illustrating a control method for allowing the LCD to display an image in a normal orientation for viewing by the user, irrespective of the open or closed status of the folding part in the above mentioned folding communication terminal, in accordance with an aspect of the present invention.

30

Figs. 5A and 5B represent images viewed by a user in the

case of a folding communication terminal of an embodiment of the present invention having a display unit comprised of a transparent LCD, wherein no modification of the displayed image is carried out upon detection of an open or closed status of the folding part. Fig. 5A shows an image in a normal orientation, as viewed on the inner side of the LCD in the open status of the folding part whereas Fig. 5B shows an image displayed in an inverted orientation, as viewed on the outer side of the LCD in the closed status of the folding part. While the icon or pictogram symbols are clearly intelligible in both cases, the inverted text messages of Fig. 5B are difficult for a user to understand.

Figs. 6A and 6B represent images viewed by a user in the case of a folding communication terminal of an embodiment of the present invention having a display unit comprised of a transparent LCD wherein modification of the displayed image is carried out upon detection of an open or closed status of the folding part is provided. As shown in Figs. 6A and 6B, the images respectively displayed on the inner and outer sides of the transparent LCD in the open and closed statuses of the folding part respectively, each have a normal orientation. Both the icon symbols and the text messages are clearly intelligible in both cases.

A method for displaying an image in a normal orientation on the transparent LCD of the above mentioned folding communication terminal, irrespective of the open or closed status of the folding part, in accordance with an

embodiment of the present invention will be described in conjunction with Fig. 4.

At step 201, the control unit 111 detects whether or not  
5 the terminal 100 is turned ON. If the terminal 100 is ON,  
step 203 is then carried out. At step 203, the control  
unit 111 checks whether or not a folding part status  
detecting signal is received from the sensing unit 121.  
If a folder status detecting signal is received, the  
10 control unit 111 then determines whether the folding part  
10 is open or closed, based on the folding part status  
detecting signal, at step 205. If the folding part 10 is  
open, step 207 is then carried out. On the other hand, if  
the folding part 10 is closed, step 211 is carried out  
15 instead.

At step 207, the control unit 111 sends a drive control  
signal to the LCD driving unit 119 in order to allow the  
LCD driving unit 119 to conduct a normal display  
20 operation for the LCD. Then, address information  
corresponding to an image to be displayed on the inner  
side of the transparent LCD 30 is read from the first  
display status address region designated in accordance  
with the open status of the folding part 10. Thereafter,  
25 the image corresponding to the read address information  
is displayed on the inner side of the transparent LCD at  
step 209. The image displayed on the inner side of the  
LCD 30 is in its normal orientation.

30 On the other hand, when the control unit 111 carries out  
step 211 after identifying the fact that the folding part

10 is closed, it sends an LCD drive control signal to the LCD driving unit 119 in order to allow the LCD driving unit 119 to conduct an inverting display operation for the LCD. The inverted display operation is performed by  
5 switching the display status address designation from the first display status address region to the second display status address region. The image displayed on the LCD is inverted, as compared with the display image discussed in the previous paragraph. The image may be inverted  
10 vertically or horizontally. At step 211, the control unit 111 transmits the LCD drive control signal corresponding to the closed status of the folding part 10 to the LCD driving unit 119. Then, the control unit 111 carries out step 213. That is, address information  
15 corresponding to an image to be displayed on the outer side of the transparent LCD 30 is read from the second display status address region designated in accordance with the closed status of the folding part 10. Thereafter, the image corresponding to the read address  
20 information is displayed on the outer side of the transparent LCD in a normal orientation.

In the case of a folding communication terminal according to certain embodiments of the present invention, having a  
25 display unit comprised of a transparent LCD, which does not provide for modification of the displayed image according to whether the folding part is open or closed, to enable an image to be displayed in a normal orientation regardless of whether the folding part is  
30 open or closed, the image displayed on the LCD has a normal orientation, as viewed by the user, only in a

selected one of the open and closed statuses of the folding part. Where such a folding communication terminal is configured to allow the image displayed on the LCD to have a normal orientation as viewed from the inner side, as shown in Fig. 5A, it has an inverted orientation when viewed from the outer side, as shown in Fig. 5B. It may be difficult for the user to understand such an image displayed in an inverted orientation on the LCD in the closed status of the folding part. However, the folding communication terminal according to preferred embodiments of the present invention overcomes this problem because it controls the LCD to display an image in a normal orientation for viewing by a user in either the open or closed status of the folding part, as shown in Figs. 6A and 6B. In accordance with the present invention, therefore, the user can easily understand the image displayed on the LCD in either the open or closed status of the folding part.

In a less preferred embodiment of the invention, the transparent LCD 30 may be arranged to show a single image, irrespective of whether the folding part is open or closed. For example, such single image could comprise pictograms such as the signal strength and battery indicators shown in Figs. 5A and 5B, and/or text messages, which may be provided both as normal text and as inverted "mirror writing". Such an embodiment may have disadvantages in that a single image comprising normal text and mirror writing may be unpleasant to read, and only half of the text area would be available to supply legible messages. A single image consisting



entirely of pictograms (icons) may be acceptable.

The configuration of Fig. 3 may be modified to provide a further embodiment of the present invention which allows  
5 the transparent LCD 30 to display an image in a normal orientation irrespective of the open or closed status of the folding part 10. For example, the memory unit 117 may have a single address region for storing address information associated with an image to be displayed, as  
10 in conventional terminals. The address information associated with the image to be displayed may then be converted by the control unit 111 in accordance with the open or closed status of the folding part 10. Where it is assumed that the image displayed has a normal  
15 orientation when the folding part 10 is in its open status, the control unit 111 converts the address information read from the address region in response to the closed status of the folding part 10 detected thereby in such a fashion that the image displayed in the closed  
20 status of the folding part 10 has a normal orientation. The control unit 111 can accomplish the conversion of the address information in various manners. For example, the image may be inverted horizontally by addressing the columns in reverse order, or the image may be inverted  
25 vertically by addressing the rows in reverse order.

The conversion of the address information can be carried out by modifying software without the change of hardware. For example, a co-ordinate conversion for address  
30 information may be used. With this co-ordinate conversion method, assuming that the open status of the folding part

10 is a reference of the co-ordinate conversion, the control unit 111 converts the Y-axis value of the address information into a corresponding negative value in response to the closed status of the folding part 10 and displays the information on the displaying surfaces of the LCD 30. In this state, the image displayed on the LCD 30 is viewed in a normal orientation on the outer side of the LCD 30 for viewing by a user when the folding part 10 is closed. Conversely, the image displayed on the LCD 30 is viewed in an inverted orientation from the inner side of the LCD 30 at this time. This causes no problem because the folding part is in its closed status and the inner side is not visible to the user.

As apparent from the above description, the co-ordinate conversion method is to convert the co-ordinate value of the address information associated with the image, to be displayed, in accordance with a direction of viewing the LCD in the open or closed status of the folding part 10. Only one set of image data need be stored in the memory of control unit 111. A person skilled in the art to which the present invention pertains will understand that the address information can be converted in the control unit 111 using other methods involving a simple software change. Therefore, no further description relating to those methods will be made.

A further method for displaying an image in a normal status on the transparent LCD of the folding communication terminal, irrespective of the open or closed status of the folding part will now be described.

This embodiment is associated with the configuration in which the control unit 111 is adapted to carry out an address conversion in a software fashion, as mentioned above.

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In accordance with this method, the control unit 111 carries out the same control operations as those of steps 201 to 205 in Fig. 4. At step 205, when the control unit 111 detects the fact that the folding part 10 is open, it  
10 drives the LCD driving unit 119 while reading address information, associated with an image to be displayed, from the address region of the memory 117, thereby causing the image to be displayed on the inner side of the LCD based on the read address information in a normal  
15 orientation. These operations are similar to those in the displaying method used in conventional folding communication terminals configured to allow the image displayed on an associated display to be viewed only from the inner side. If the control unit 111 detects the  
20 closed status of the folding part 10 at step 205, it again reads the address information, associated with an image to be displayed, from the address region of the memory 117, but then converts the read address information in accordance with a set address conversion  
25 program (for example, an address co-ordinate conversion program) so that the image is displayed in an inverted fashion, so as to appear in normal orientation to a user viewing the outer side of the transparent LCD 30, based on the converted address information.

30

In the preferred displaying methods of the present

invention, the image in the open status of the folding part is displayed in a normal orientation on the inner side of the transparent LCD 30 while being displayed in an inverted orientation on the outer side of the transparent LCD 30. In the closed status of the folding part, the image is displayed in an inverted orientation on the first display screen of the transparent LCD 30 while being displayed in a normal status on the second display screen of the transparent LCD 30.

10

As apparent from the above description, the present invention provides a folding communication terminal having a display unit comprised of a transparent display fixedly mounted in an opening formed through a folding part of the terminal while using a configuration capable of allowing the transparent LCD to display an image in a normal orientation to the user regardless of the open or closed status of the folding part. A number of display control methods are provided according to the present invention. In accordance with a first display control method, a control unit controls a memory unit which includes a first display status address region stored with address designation information for allowing an image to be displayed in a normal orientation on the inner side of a transparent LCD in an open status of the folding part, and a second display status address region stored with address designation information for allowing an image to be displayed in a normal orientation on the outer side of the transparent LCD in a closed status of the folding part. In accordance with this method, one or other of the display status address regions is designated

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in accordance with the open or closed status of the folding part sensed by a folder sensing unit. In accordance with a second display control method, a memory unit is used which includes a single memory region for storage of image information. When the folding part sensing unit senses the open or closed status of the folding part, the control unit reads address information, associated with an image to be displayed, from the single memory region irrespective of the sensed open or closed status of the folding part. The address information is then converted in accordance with an address conversion program, in response to the sensed open or closed status of the folding part, in order to allow the transparent LCD to display the image in a normal orientation as viewed from either the inner side or the outer side of the display, as determined by the respective open or closed status of the folding part.

As described above, the present invention provides an advantage in that the user can view the image displayed on a single display unit mounted to the folding part of a folding communication terminal, without opening the folding part.

The present invention also provides the advantage that since the display unit mounted to the folding part has a transparent structure capable of allowing the image displayed on the displaying unit to be viewed from both sides of the displaying unit, the user can view the displayed image in either the open or closed status of the folding part.

The present invention has another advantage in that it provides an apparatus for displaying information in a folding communication terminal configured to allow the user to view information, displayed in either the open or closed status of the folding part of the terminal, which apparatus is capable of displaying information in the form of an image of normal orientation in both the open and closed status of the folding part while using a single display unit mounted to the folding part.

While the present invention has been particularly shown and described with reference to a particular embodiment thereof, it will be understood by those skilled in the art that various changes in form and detail may be effected therein without departing from the scope of the invention as defined by the appended claims.

While the part containing the display is referred to as a folding part this is merely a label to identify it, and distinguish it from the part which does not contain the display. From a consideration of Figs. 1 and 2, it can be appreciated that neither part 10 nor 20 need be any more "folding" than the other.

**CLAIMS:**

1. A folding communication terminal, comprising:
  - a folding part of the communication terminal; and
  - 5       - a transparent display unit mounted in an opening formed through a portion of the folding part, the display unit being visible from both inner and outer sides of the folding part,whereby images displayed on the display unit are visible  
10   to a user irrespective of whether the folding part is open or closed.
  
2. A folding communication terminal according to claim 1, further comprising:
  - 15       - a sensing unit for generating a sensing signal according to whether the communication terminal is open or closed; and
  - a control unit for displaying an image on the display unit according to the sensing signal, such that
  - 20   the image is displayed in a normal orientation when viewed from one of inner and outer sides of the folding part, according to the sensing signal.
  
3. A folding communication terminal according to claim 2  
25   further comprising a driving unit for driving the display unit under the control of the control unit.
  
4. A folding communication terminal according to claim 2 or claim 3, further comprising:
  - 30       - a memory unit, including:
    - a first display status address region for

storing address designation information adapted to allow the image to be displayed in a normal orientation on the display unit, when viewed from the outer side of the folding part, and

- 5           - a second display status address region for storing address designation information adapted to allow the image to be displayed in a normal orientation on the display unit, when viewed from the inner side of the folding part; and

- 10          - control means for selecting one of the display status address regions, based on the sensing signal; and

          - a driving unit for driving the display unit under the control of the control unit.

- 15   5. A folding communication terminal according to claim 2 or claim 3, comprising:

          - a memory unit including

- an address region for storing address designation information associated with an image to be displayed on  
20   the display unit; and

          a program storage region for storing address conversion programs adapted to be selectively designated in accordance with the sensing signal; and

- control means for selecting one of the address  
25   conversion programs, and for correspondingly converting the address designation information, in accordance with the sensing signal.

- 30   6. A method for displaying information in a folding communication terminal having a sensing unit for detecting whether a folding part is open or closed, and a



transparent display unit mounted in an opening formed through the folding part, the transparent display unit being visible from both inner and outer sides of the folding part, the method comprising the steps of:

5       - detecting whether the folding part is open or closed; and

          - controlling the display unit, based on the result of the detection, such that when the folding part is closed, the image is displayed in a normal orientation as  
10       viewed from the outer side of the folding part, while being displayed in an inverted orientation as viewed from the inner side of the folding part.

7. The method as claimed in claim 6, further comprising  
15       the step of:

          - controlling the display unit, based on the result of the detection, such that when the folding part is open, the image is displayed in a normal orientation as viewed from the inner side of the folding part, while  
20       being displayed in an inverted orientation as viewed from the outer side of the folding part.

8. A method according to claim 6 for displaying information in a folding communication terminal which  
25       further includes:

          - a memory unit including a first display status address region for storing address designating information adapted to allow an image to be displayed in a normal orientation as viewed from the  
30       inner side of the folding part, and a second display status address region for storing address

designating information adapted to allow the image to be displayed in a normal orientation as viewed from the outer side of the folding part; and

- a driving unit for driving the display unit,

5 the method further comprising the steps of:

- selecting one of the first and second display status address regions, based on the result of the detection; and

- reading address information, associated with the  
10 image to be displayed on the display unit, from the selected display status address region, and

- controlling the display unit, based on the read address information, to display the image.

15 9. A method according to claim 6 for displaying information in a folding communication terminal which further includes

- a memory unit including an address region containing address designation information  
20 associated with an image to be displayed on the display unit and address conversion programs, and

- a control unit for converting the address information associated with the image to be displayed,

25 the method further comprising the steps of:

- reading address information, associated with the image to be displayed on the display unit, from the address region;

- selecting one of the address conversion programs,  
30 according to whether the folding part is open or closed;

- in accordance with the selected one of the address

conversion programs, converting the read address information into address information suitable for displaying the image in the relevant orientation; and

- displaying the image in the relevant orientation.

5

10. A folding communication terminal substantially as described and/or as illustrated in the accompanying drawings.

10 11. A method for displaying information in a folding communication terminal, substantially as described and/or as illustrated in the accompanying drawings.



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Claims searched: All

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## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): H4T(TBAX, TBEX, TCGX, TCXX);H4J(JK)

Int Cl (Ed.7): G06F(1/16, 3/147, 15/02);H04M(1/02)

Other: Online: EPODOC, JAPIO, WPI

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	WO98/38822A1 (MOTOROLA) - see abstract and figures 1 and 2	All
X	EP0807879A2 (SHARP) - see abstract	All
X	JP06-195151A (BROTHER IND LTD) - see abstract	All
X	JP06-043967A (TOSHIBA) - see abstract	All
X	JP03-253962A (SEIKO) - see abstract	All

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